

Clearwater Lower Mainstem Summer Steelhead Population Viability Assessment

The Clearwater Lower Mainstem population (Figure 1) is part of the Snake River Steelhead ESU which has six major population groupings, including: Lower Snake River, Clearwater River, Grande Ronde River, Salmon River, Hells Canyon, and the Imnaha River. The ESU contains both A and B run steelhead. The Clearwater Lower Mainstem population is a A-run and resides in the Clearwater River MPG.

The ICTRT classified the Clearwater Lower Mainstem population as a “large” population (Table 1) based on historical habitat potential (ICTRT 2005). A steelhead population classified as large has a mean minimum abundance threshold of 1500 naturally produced spawners with sufficient intrinsic productivity to achieve a 5% or less risk of extinction over a 100-year timeframe.

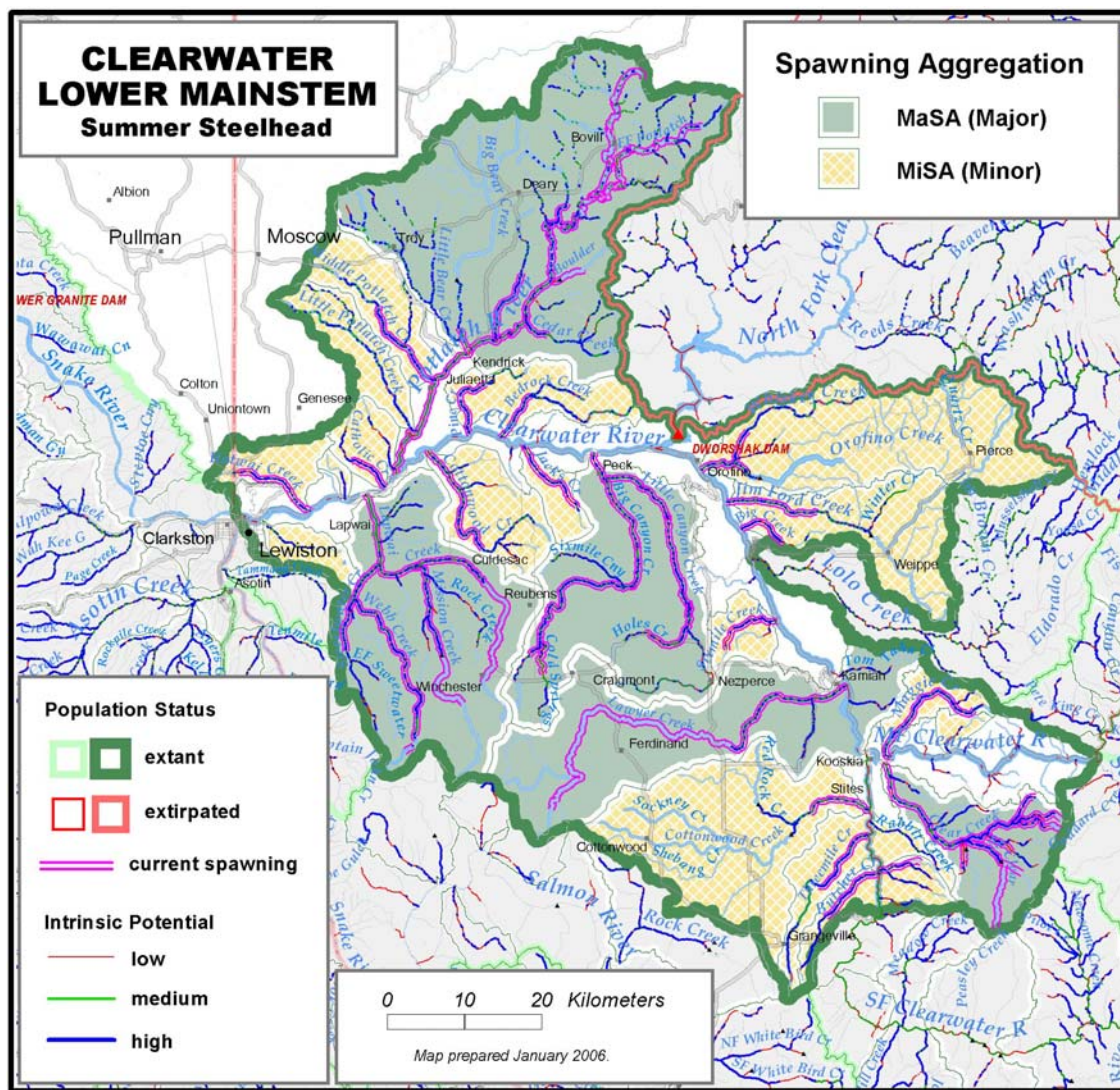


Figure 1. Clearwater Lower Mainstem steelhead major and minor spawning areas.

Table 1. Clearwater Lower Mainstem steelhead basin statistics

Drainage Area (km2)	6,848
Stream lengths km* (total)	2,111
Stream lengths km* (below natural barriers)	1,500
Branched stream area weighted by intrinsic potential (km2)	4,809
Branched stream area km2 (weighted and temp. limited)	4,809
Total stream area weighted by intrinsic potential (km2)	6,136
Total stream area weighted by intrinsic potential (km2) temp limited	4,569
Size / Complexity category	Large / “B” (dendritic structure)
Number of MaSAs	5
Number of MiSAs	16

*All stream segments greater than or equal to 3.8m bankfull width were included

**Temperature limited areas were assessed by subtracting area where the mean weekly modeled water temperature was greater than 22°C.

Current Abundance and Productivity

Current natural abundance (number of adults spawning in natural production areas) is unknown for this population. There are no methods (weirs, traps, etc.) or surveys to enumerate adult abundance in the population. Surveys of juvenile density or abundance are conducted in some stream reaches. Large numbers of hatchery origin steelhead pass through the population in the mainstem Clearwater River, both as juveniles and adults. Those fish originate from hatchery programs upstream of the population. The number of downstream migrating juvenile steelhead that cease their migration and become freshwater residents in the population and the number of upstream migrating adults that stop short of the release locations and spawn in the population both are unknown.

Abundance and productivity of the population are unknown. Table 2 and Figure 2 are included as placeholders while abundance and productivity are being assessed.

Table 2. Clearwater Lower Mainstem steelhead abundance and productivity measures.

10-year geomean natural abundance
20-year return/spawner productivity
20-year return/spawner productivity, SAR adj. and delimited*
20-year Bev-Holt fit productivity, SAR adjusted
20-year Lambda productivity estimate
Average proportion natural origin spawners (recent 10 years)
Reproductive success adj. for hatchery origin spawners

*Delimited productivity excludes any spawner/return pair where the spawner number exceeds 75% of the size category threshold for this population. This approach attempts to remove density dependence effects that may influence the productivity estimate.

Comparison to the Viability Curve

- Abundance: Unknown
- Productivity: Unknown
- Curve: Hockey-Stick curve
- Conclusion: Clearwater Lower Mainstem Summer Steelhead population is at **HIGH** risk based on uncertainty in current abundance and productivity. (Figure 3).

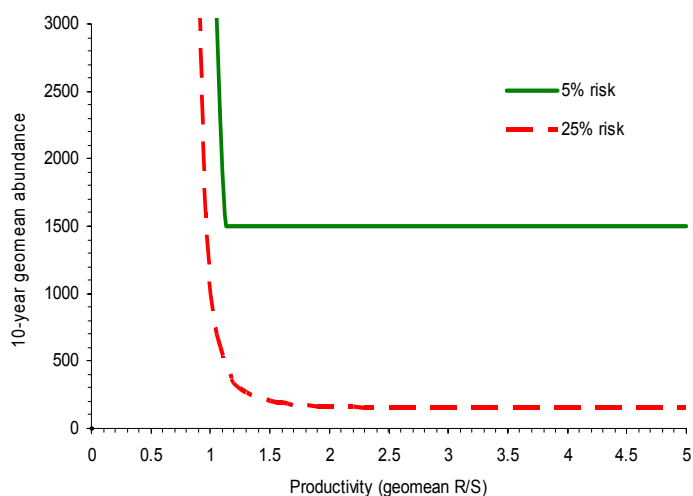


Figure 2. Clearwater Lower Mainstem steelhead viability curve. Current abundance and productivity estimates are unknown for this population.

Spatial Structure and Diversity

The ICTRT has identified five major spawning areas (MaSAs) and sixteen minor spawning areas (MiSAs) within the Clearwater Lower Mainstem steelhead population. Spawning is distributed widely across the population, and occurs in all major and minor spawning areas. All major tributaries and numerous small tributaries are currently utilized (Fig. 1). Mainstem areas are not utilized for spawning.

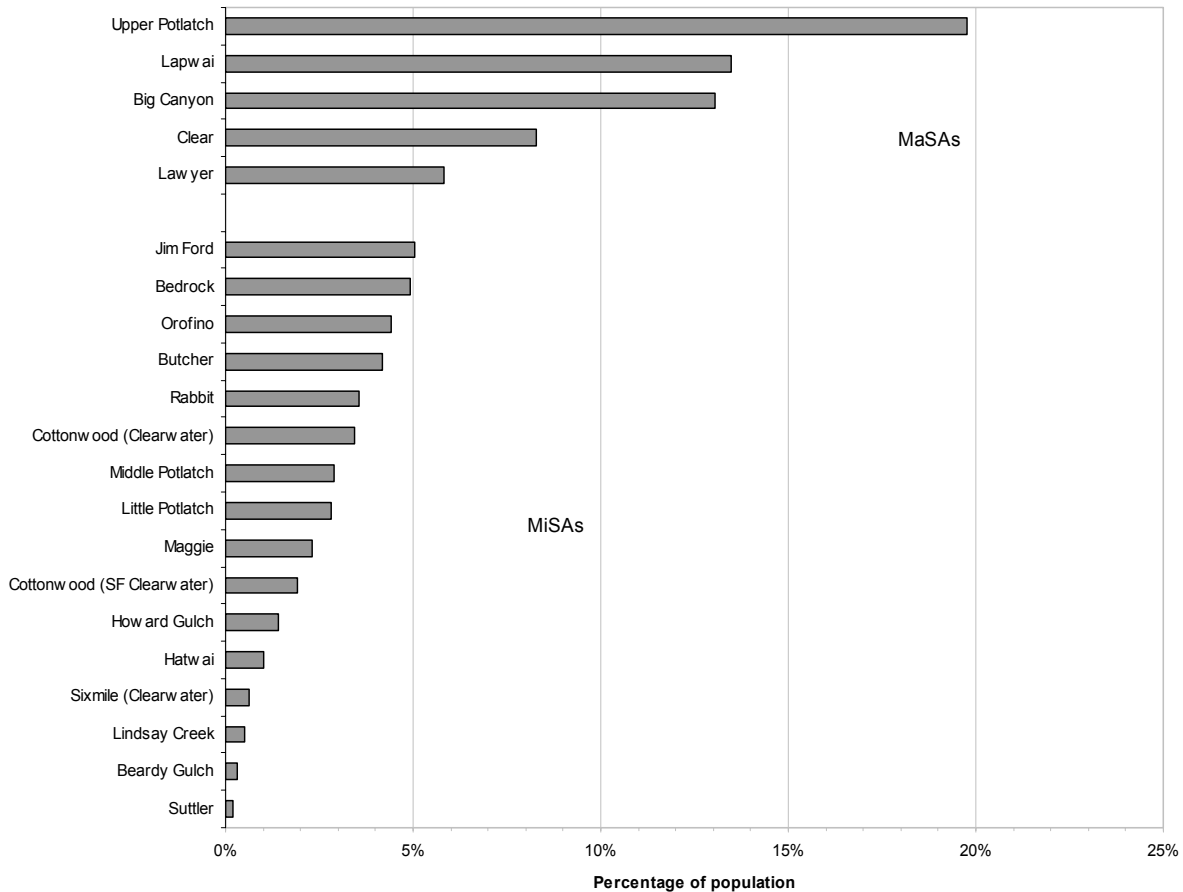


Figure 3. Proportion of major and minor spawning areas that make up the Clearwater Lower Mainstem steelhead population. There are no modeled temperature limitations for the MiSA/MaSA in this

Factors and Metrics

A.1.a. Number and spatial arrangement of spawning areas.

The Lower Mainstem Clearwater Steelhead population has five MaSAs (Big Canyon, Clear, Lapwai, Lawyer, and Upper Potlatch) and thirteen MiSAs (Fig. 3). This metric is rated *Very Low* risk.

A.1.b. Spatial extent or range of population.

Habitat use by steelhead was determined from steelhead redd counts and juvenile surveys conducted by IDFG. Redd count data for the population is very limited, especially with respect to the number and frequency of surveys. The data shows widely distributed utilization, and only three of the smallest MiSAs as being unoccupied. Although a Very Low Risk rating for this metric could be inferred from the data, the metric is rated as *Low Risk*. The redd distribution data is not current and may not reflect the true current status of the population. Because of this uncertainty in the data the higher risk rating was applied.

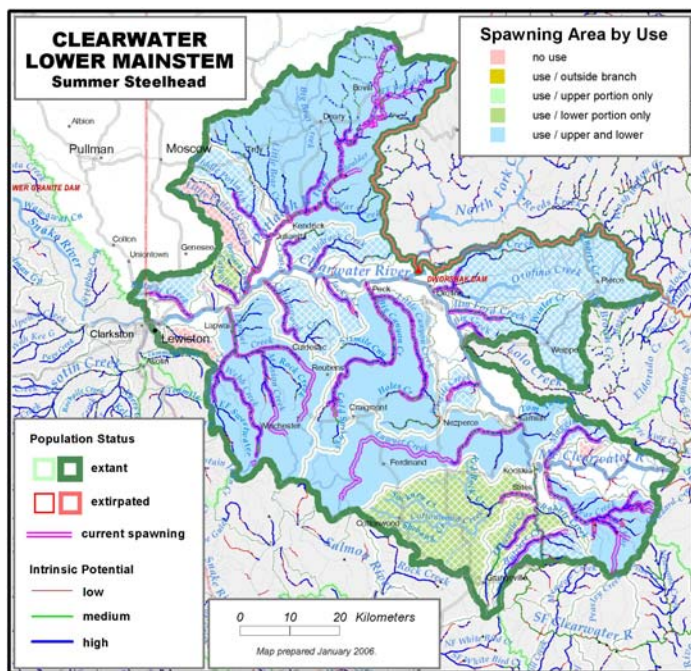


Figure 4. Clearwater Lower Mainstem steelhead population distribution and habitat use.

A.1.c. Increase or decrease in gaps or continuities between spawning areas.

There has been little change in gaps between spawning aggregates when comparing current and historic distributions. The population is rated at *Very Low* risk because all historical MaSAs are occupied, gap distance and continuity have changed little, and there has been no increase in distance between this population and other populations in the MPG or DPS. Although three of the smallest MiSAs were determined to be unoccupied, gaps between spawning aggregates were not increased substantially.

B.1.a. Major life history strategies.

There are limited data to allow any direct comparisons between historic life history strategies and current strategies. Anthropogenic impacts have resulted in water flow (volume and timing) and water temperature changes from historic conditions. Fish movement pathways and continuity of habitat for juvenile steelhead have likely been influenced by flow and temperature changes. Some middle and lower mainstem reaches may become uninhabitable during summer low flow periods. Although flow and temperature changes may have influenced life history strategies, it is not likely they have influenced major life history strategies or pathways. Anadromous *O. mykiss*

persists in the population, only the adult summer run timing was present historically and only A-run type fish historically occupied the population. It appears all historic major life history pathways are present, although the mean and variability may have shifted slightly. The population was rated at *Low Risk* for this metric.

B.1.b. Phenotypic variation.

There is no direct evidence for loss or substantial change in phenotypic traits from historic conditions. The changes in flow patterns and temperature profiles discussed above (metric B.1.a) likely have reduced the variation in both juvenile migration and adult spawn timing. Reduced flows and elevated water temperatures result in a narrower window for successful smolt outmigration as well as truncation of adult spawn timing. Adult entry into freshwater and arrival on the spawning grounds likely has not changed however, adult entry into the Snake River and migration through the lower Snake River in late summer and early fall is delayed because of elevated mainstem temperatures. It is hypothesized that adult upstream migration has changed from historic conditions due to temperature effects; magnitude of the change is unknown. The population is rated at *Low Risk* for this metric because of the substantial change in adult run timing and likely changes in the mean and variability of juvenile migration and movement patterns.

B.1.c. Genetic variation.

Genetic ratings were based on IC-TRT analysis of allozyme data presented in Winans et al. (2001) and Waples et al. (1993) and microsatellite data presented in Moran (2003). The ICTRT analysis of available information revealed differentiation among subcomponents within the population and clustering of those subcomponents within the Clearwater River group. The among population grouping was hierarchically consistent with the geographical arrangement, and samples showed no similarity to the single hatchery sample available. The metric was rated *Very Low risk*.

B.2.a. Spawner composition.

No surveys are conducted to determine the proportion of naturally spawning fish that are hatchery origin. Some qualitative information on spawner composition can be obtained from an analysis of coded-wire tags (CWT) recovered from harvested fish. However, the location of this population is such that large numbers of hatchery fish swim through the population when migrating to their “home” area, and many are intercepted during this migration. Only hatchery-origin steelhead are coded-wire tagged and can be harvested in recreational fisheries; it is not possible to determine if natural-origin strays are entering the population.

From 1978 through 2004 a total of 1,575 CWTs was recovered within the population from known-origin hatchery steelhead. Those fish are allocated to each of the categories as follows. Only actual recoveries are reported here; no expansions were made for proportion of release groups tagged or sampling rates.

(1) *Out-of-DPS strays*. Twenty three CWT recoveries are reported here as out-of-DPS strays because they originated from fish released into the Touchet and Walla Walla rivers. However, the fish released were Lyons Ferry Hatchery stock, which was sourced primarily or exclusively from Snake River steelhead

(2) *Out-of-MPG strays from within the DPS.* A total of 263 CWT recoveries fell into this category. Eighty-nine of these were from the Lower Snake River MPG, and most of those were Lyons Ferry Hatchery stock. These fish migrated to and were intercepted at a point substantially upstream of their release (home) location. It is not known whether or not these types of strays would migrate back downstream prior to spawning or would spawn within the population. Seven CWTs were recovered from fish released in the Snake River downstream of Hells Canyon Dam, 121 originated from releases in the Grande Ronde River and Imnaha River MPGs and 46 originated from releases in the Salmon River MPG. It is likely that a number of these fish were intercepted while seeking cool water refuge in the Clearwater River before continuing their migration up the Snake River.

(3) *Out of population within MPG strays.* The majority of CWT recoveries (1,471) within the population fell into this category. It is incorrect to categorize these fish as strays however, because they were released as juveniles at locations upstream of the population and must migrate through this population to reach their release location.

(4) *Within-population hatchery spawners.* There is no within-population hatchery program, nor is there an A-run hatchery program in the MPG.

Overall spawner composition was rate at *Moderate Risk*. That rating was arrived at because of the consistent presence of out-of-population hatchery fish known to enter the population and the high degree of uncertainty regarding the contribution of those fish to natural spawning. Also, in recent years unmarked hatchery steelhead have been released in many locations for supplementation purposes. Because these fish are not marked with and adipose fin clip, they are not susceptible to recreational harvest. These releases will increase the number of hatchery-origin fish spawning naturally, this supplementation of planned to continue for some time into the future.

B.3.a. Distribution of population across habitat types.

The Clearwater Lower Mainstem steelhead population intrinsic potential habitat historically was distributed across 13 EPA level IV ecoregions (Table 3). The ICTRT criteria for this metric considers only ecoregions that contained more than 10% of the weighted spawning area for a population. If the habitat were equally distributed across all ecoregions, none would be considered in this metric. Considering the distribution of current spawning across the ecoregions and the large number of ecoregions, this metric was rated *Very Low* risk.

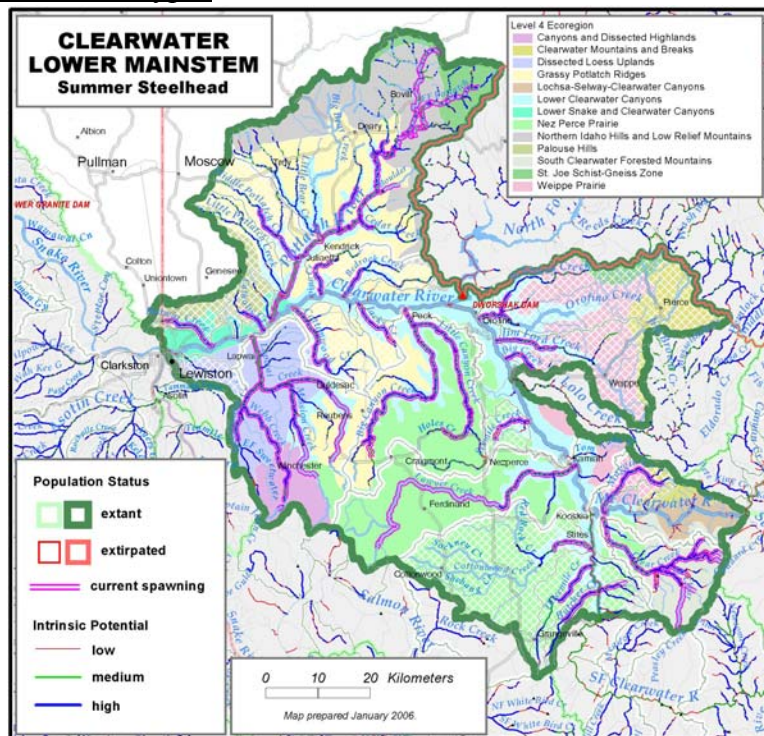


Figure 5. Clearwater Lower Mainstem steelhead population distribution across various ecoregions.

Table 3. Clearwater Lower Mainstem steelhead—proportion of spawning areas across various ecoregions.

Ecoregion	% of historical branch spawning area in this ecoregion (non-temperature limited)	occupied (non-temperature limited)
Canyons and Dissected Highlands	0.9	1.2
Clearwater Mountains And Breaks	0.5	0.1
Dissected Loess Uplands	12.2	11.2
Grassy Potlatch Ridges	9.8	3.0
Lochsa-Selway Clearwater Canyons	0.1	0.0
Lower Clearwater Canyons	57.9	64.2
Lower Snake and Clearwater Canyons	3.0	4.8
Nez Perce Prairie	2.3	3.5
Northern Idaho Hills and Low Relief Mountains	1.8	2.1
Palouse Hills	0.4	0.0
South Clearwater Forested Mountains	5.7	6.9
St. Joe Schist-Gneiss Zone	2.2	0.7
Weippe Prairie	3.2	2.3

B.4.a. Selective change in natural processes or selective impacts.

Hydropower system: The hydrosystem and associated reservoirs impose some selective mortality on smolt outmigrants and adult migrants, the selective mortality is not likely to remove more than 25% of the affected individuals. The likely impacts are rated as *Low Risk* for this action.

Harvest: Overall harvest impacts on steelhead populations are unknown. There are no freshwater recreational fisheries directly targeting naturally produced steelhead; indirect mortalities are expected to occur in some fisheries selective for hatchery fish. It is unlikely that the incidental mortalities from recreational fisheries are selective. Harvest of steelhead in mainstem Columbia River gillnet fisheries may be selective, related to the mesh size of gillnets used. Further assessment is necessary to determine the extent of selective mortality occurring related to harvest. This action was rated as *Moderate Risk* because the population has been affected over many generations, the action is expected to continue into the future and because of the high degree of uncertainty in overall effect.

Hatcheries: There are no hatchery programs within this population and hatchery programs in proximate populations are not suspected to have a selective impact on this population. The selective impact of hatchery actions was rated as *Low risk*.

Habitat: Habitat changes resulting from land use activities in the basin may impose some selective mortality, but the extent is unknown. It is likely that any selective mortality impacts would affect a non-negligible portion of the population. The effects of land use activities upstream of the population boundary likely do not impose selective mortality on this population. This selective impact was rated *Low Risk*.

Spatial Structure and Diversity Summary

Overall spatial structure and diversity has been rated *Low Risk* for the Clearwater Lower Mainstem steelhead population (Table 4). This risk rating is driven by the diversity metrics and is most influenced by spawner composition and the selective impacts of hatchery actions. There is a concern that the risk rating may be increased to Moderate, pending a more in-depth assessment of spawner composition and harvest impacts.

Table 4. Spatial structure and diversity scoring table

Metric	Risk Assessment Scores				
	Metric	Factor	Mechanism	Goal	Population
A.1.a	VL (2)	VL (2)	Very Low Risk (Mean = 1.67)	Very Low Risk	Low Risk
A.1.b	L (1)	L (1)			
A.1.c	VL (2)	VL (2)			
B.1.a	L (1)	L (1)	Low Risk	Low Risk	
B.1.b	L (1)	L (1)			
B.1.c	VL (2)	VL (2)			
B.2.a(1)	L (1)	M (0)	Moderate Risk		
B.2.a(2)	L (1)				
B.2.a(3)	L (1)				
B.2.a(4)	na				
B.3.a	VL (2)	VL (2)	Very Low Risk		
B.4.a	M (0)	M (0)	Moderate Risk		

Overall Viability Rating

The Clearwater Lower Mainstem steelhead population does not currently meet viability criteria because Abundance/Productivity risk tentatively has been rated as High Risk and does not meet the criteria for a viable population (Fig. 6). Improvement in abundance/productivity status (reduction of risk level) will need to occur before the population can be considered viable. Also, the population currently does meet the criteria for a “maintained” population but the overall spatial structure/diversity rating is sufficiently low that the population could achieve Highly Viable status.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	
	High (>25%)		Clearwater Lower Mainstem		

Viability Key: HV – Highly Viable; V – Viable; M – Maintained; Shaded cells – does not meet viability criteria.

Figure 6. Viable Salmonid Population parameter risk ratings for the Clearwater Lower Mainstem steelhead population. This population does not meeting viability criteria.